

Type I Progress Report

- a. Title. The Interdependence of Lake Ice and Climate in Central North America.
- b. Proposal Number. 113
- c. GSFC ID Number. PR506
- d. Problem Areas. During the last reporting period the Programmer assigned to this project terminated his job with WOLF. As a result, the software development portion of this investigation has slipped approximately one month. The subsequent delay in completion of the software package is not expected to adversely impact image analysis, because the majority of data processing routines have been tested and debugged.
- e. Accomplishments. The final selection of 233 study lakes has been made; their geographical distribution is indicated in Table 1. Each lake was assigned a unique identification code number which in turn was plotted on an Operational Navigation Chart (scale 1:1,000,000). During image analysis, the identification code accompanied by the lake freeze/thaw code will facilitate updating of the data base. The primary data base is stored on magnetic tape and consists of the following information for each lake: name, identification code, latitude, longitude, political subdivision, area (sq. km.), mean depth (meters), maximum depth (meters), and freeze date/thaw date for each winter season. Details of all operational aspects of the study will be presented in the Data Analysis Plan and Type II Progress Report.

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Arrangements have been made with NASA/GSFC, Meteorology Branch, to borrow North American Surface Charts (1200Z) on a weekly basis beginning October 6, 1972. These weather data will be supplemented by a subscription to the Weekly Series of Daily Weather Maps published by NOAA.

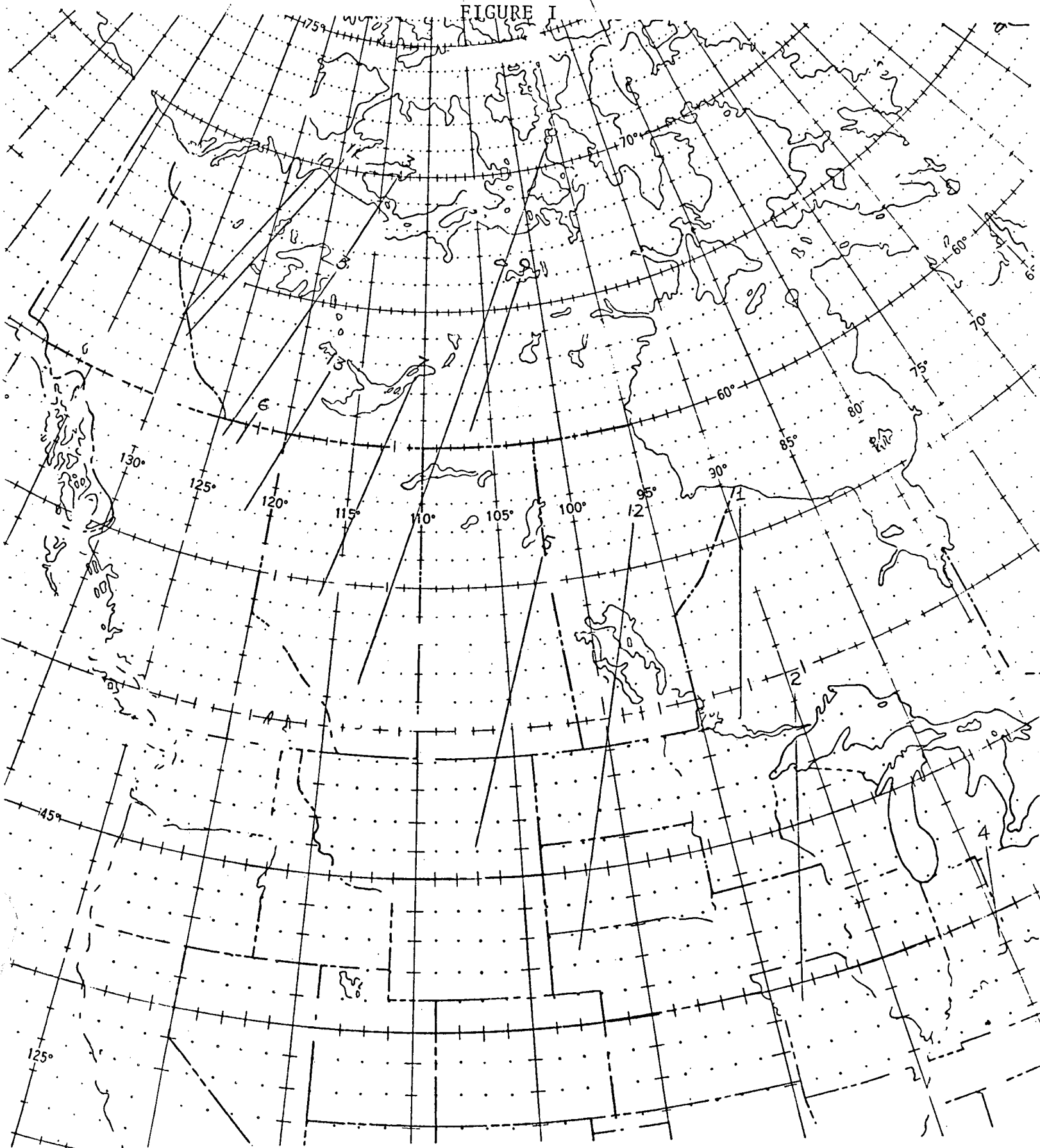
To date imagery of the swaths shown on Figure 1 have been received. These were catalogued by date and image sequence number and reviewed for applicability to this study, image descriptor content, or unusual natural phenomena. One such phenomenon is reported on below.

- f. Projected Work. During the next bi-monthly reporting period, the following tasks are planned:
- Software Package Completion. Final coding, testing, and debugging of data analysis and data display computer programs will be carried out.
 - Image Analysis. Operational image analysis is expected to begin upon the receipt of imagery taken in mid-September.
- g. Results. The imagery received thus far do not contain information pertinent to this investigation. Therefore, no results concerning lake ice are available this reporting period. A brief description of an unusual hydrologic process unrelated to lake ice is presented in the attached report.
- h. Publications. None.
- i. Recommendations. None.
- j. Standing Order Form Changes. None.
- k. Data Request Forms. Data Request Forms were submitted on the following dates:
1. August 11, 1972
 2. October 2, 1972.
1. Image Descriptor Forms. Attached.

Table 1. Geographical Breakdown of Candidate Lakes
To Be Used in The Lake Ice Investigation And
Those Lakes Selected For Intensive Study

<u>COUNTRY</u>	<u>PROVINCE/STATE</u>	<u>CANDIDATE LAKES</u>	<u>STUDY LAKES</u>
CANADA	Northwest Territories	33	19
	Alberta	10	8
	Saskatchewan	50	24
	Manitoba	41	28
	Ontario	24	7
	Sub-Total	158	86
UNITED STATES	Illinois	15	15
	Indiana	6	4
	Iowa	8	4
	Michigan	21	3
	Minnesota	5	3
	Nebraska	30	0
	North Dakota	6	5
	South Dakota	11	11
	Wisconsin	151	102
	Sub-Total	253	147
	TOTAL	411	233

FIGURE I



ERTS FLIGHT PATHS

- | | | | |
|--------------|--------------|---------------|---------------|
| 1. 27 JUL 72 | 5. 23 AUG 72 | 9. 28 AUG 72 | 13. 19 AUG 72 |
| 2. 30 AUG 72 | 6. 21 AUG 72 | 10. 28 AUG 72 | 14. |
| 3. 22 AUG 72 | 7. 01 SEP 72 | 11. 27 AUG 72 | 15. |
| 4. 24 AUG 72 | 8. 29 AUG 72 | 12. 19 AUG 72 | 16. |

Title: Mackenzie River Flow Pattern

Discipline: Water Resources (River Monitoring)

Summary: ERTS 1 imagery of August 22, 1972, scene number E-1030-19014, covers a portion of the Mackenzie River, Northwest Territories, Canada, from just east of Fort Simpson to a point near Wrigley. MSS bands 5(0.6-0.7 μ) and 6(0.7-0.8 μ) show a visible difference in image density from bank to bank across the river. The density contrast is less apparent on MSS bands 4(0.5-0.6 μ) and 7(0.8-1.1 μ). Geographically the phenomena is detectable from the intersection of the Liard River with the Mackenzie, downstream to the edge of the scene, a distance in excess of 200 km.

Examination of the imagery indicates that the density contrast is real and probably due to the association of two greatly different water types. The source of the Mackenzie River is Great Slave Lake, whereas the Liard River rises in the Pelly Mountains (Rocky Mountain chain) and is fed by numerous mountain tributaries. Consequently, in view of the time of year, the Mackenzie River is probably carrying relatively clear, sediment-free water out of Great Slave Lake while the Liard River is transporting a considerable amount of suspended sediment produced by stream erosion. This interpretation is borne out by the fact that the Liard is more reflective than the Mackenzie in the red and near-IR part of the spectrum, as would be expected from a sediment-laden stream.

The fact that two contrasting water types meet at a confluence and maintain their identity downstream (i.e., fail to initially mix) is not unusual. What is unusual in this case is the distance over which separate identities are apparently maintained: more than 200 km. Natural turbulent flow, even in a sluggish stream, should produce complete mixing within a relatively short distance. The small degree of lateral mixing in the Mackenzie River, as indicated by ERTS 1 imagery, should offer many interesting problems for hydrologists and hydrodynamicists.

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

DATE

10/6/72

PRINCIPAL INVESTIGATOR

Allan Jelacic

GSFC

P506

ORGANIZATION

Wolf R & D Corp

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PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	LAKE CLUSTER	LINEA- MENTS	LUMBERING AREA	
100416351X	✓			
100416360X				lake chain
1029185625				river bars; natural levees
103019011M	✓	✓		
1030190205				river bars; natural levees
103117262M			✓	
103117265M				dam; reservoir
1031172805				dendritic drainage
1031172606	✓	✓		
1031172735				city; airfield
103117283M				dam; reservoir
1038162455			✓	city
1040181745			✓?	network
1040181815			✓?	network

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

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